



QUEST

ADVENTURES IN THE WORLD OF SCIENCE

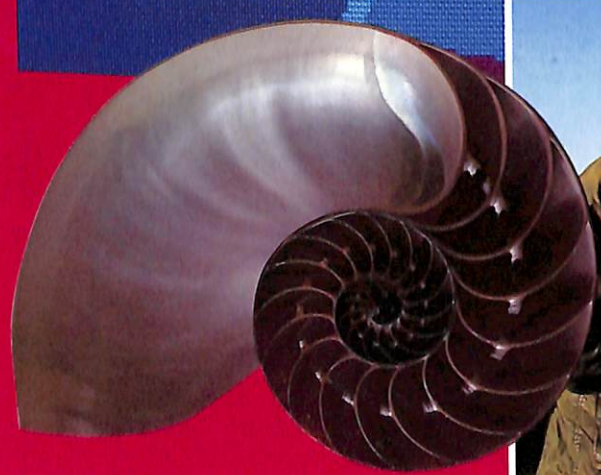
SCIENCE OF NUMBERS

42

FACT FILES ON:

- ▶ Map-making
- ▶ Betting systems
- ▶ Digital art
- ▶ Chaos theory
- ▶ Numbers in nature
- ▶ Measuring the Earth
- ▶ Hidden dimensions

THREE PROJECTS



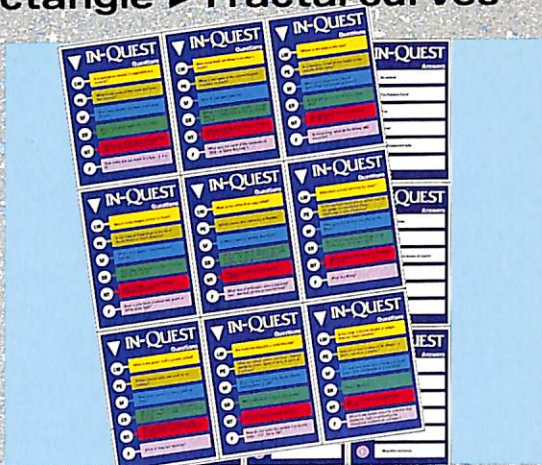
GIANT POSTER: HOLES IN SPACE

Q & A CARDS

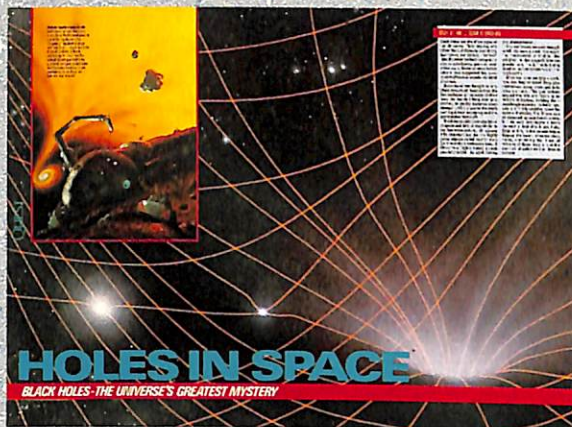
INSIDE THIS PACK

FACT FILES

- Natural geometry ► Games of chance ► Latitude and longitude ► Satellite surveys ► On-screen 'sculptures' ► The SI system ► The Golden Rectangle ► Fractal curves



More In-Quest Q & A cards

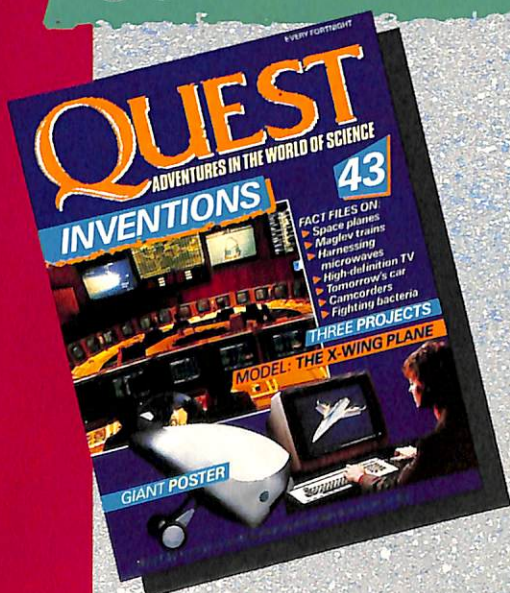


POSTER
Black holes

THREE
SCIENTIFIC
PROJECTS



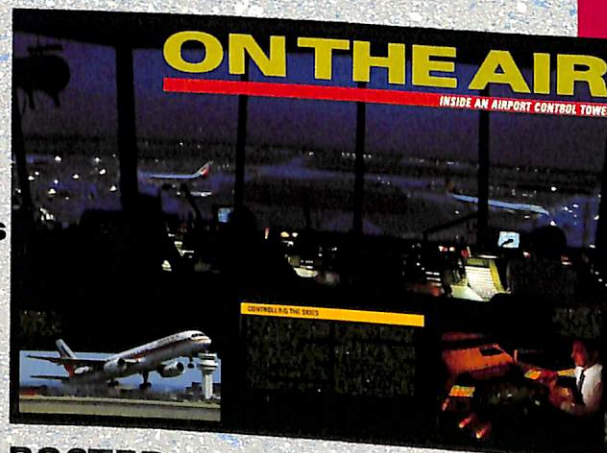
COMING IN QUEST 43 INVENTIONS



MODEL
The X-Wing

FACT FILES INCLUDE:

- The Space plane
- High Definition TV
- In-car navigation systems
- Harnessing microwaves
- Magnetic levitation
- Micro-batteries



POSTER
Airport control tower

ISSN 1350-3766



DATAQUEST

MATHEMATICS: SOME IMPORTANT POLYGONS (MANY-SIDED FIGURES)

NAME	SIDES	NAME	SIDES	NAME	SIDES
triangle	3 sides	hexagon	6 sides	nonagon	9 sides
quadrilateral	4 sides	heptagon	7 sides	decagon	10 sides
pentagon	5 sides	octagon	8 sides	dodecagon	12 sides

WEAPONS III: MARITIME FORCES

NAVAL FORCES	USA	Russia	UK	China
submarines	127	207	23	46
carriers	14	4	2	-
battleships/cruisers	46	40	-	-
destroyers/frigates	156	170	48	56
amphibious	42	77	6	58

NAVAL AIR

bombers	-	270	-	50
attack	430	} 180	-	} 100
air defence/fighter	370		41	
anti-sub. fixed wing	130	-	-	10
anti-sub. helicopter	240	150	150	62

ENTERTAINMENT: ACADEMY AWARD FOR BEST FILM

YEAR	TITLE	YEAR	TITLE
1932	Cimarron (US)	1963	Lawrence of Arabia (GB)
1933	Grand Hotel (US)	1964	Tom Jones (GB)
1934	Cavalcade (US)	1965	My Fair Lady (US)
1935	It Happened One Night (US)	1966	The Sound of Music (US)
1936	Mutiny on the Bounty (US)	1967	A Man for All Seasons (GB)
1937	The Great Ziegfeld (US)	1968	In the Heat of the Night (US)
1938	The Life of Emile Zola (US)	1969	Oliver! (GB)
1939	You Can't Take It With You (US)	1970	Midnight Cowboy (US)
1940	Gone with the Wind (US)	1971	Patton (US)
1941	Rebecca (US)	1972	The French Connection (US)
1942	How Green was my Valley (US)	1973	The Godfather (US)
1943	Mrs Miniver (US)	1974	The Sting (US)
1944	Casablanca (US)	1975	The Godfather, Part Two (US)
1945	Going my Way (US)	1976	One Flew Over the Cuckoo's Nest (US)
1946	The Lost Weekend (US)	1977	Rocky (US)
1947	The Best Years of Our Lives (US)	1978	Annie Hall (US)
1948	Gentlemen's Agreement (US)	1979	The Deer Hunter (US)
1949	Hamlet (GB)	1980	Kramer vs Kramer (US)
1950	All the King's Men (US)	1981	Ordinary People (US)
1951	All About Eve (US)	1982	Chariots of Fire (GB)
1952	An American in Paris (US)	1983	Ghandi (GB)
1953	The Greatest Show on Earth (US)	1984	Terms of Endearment (US)
1954	From Here to Eternity (US)	1985	Amadeus (US)
1955	On the Waterfront (US)	1986	Out of Africa (US)
1956	Marty (US)	1987	Platoon (US)
1957	Around the World in 80 Days (US)	1988	The Last Emperor (It/GB/Chn)
1958	The Bridge on the River Kwai (GB)	1989	Rain Man (US)
1959	Gigi (US)	1990	Driving Miss Daisy (US)
1960	Ben Hur (US)	1991	Dances with Wolves (US)
1961	The Apartment (US)	1992	The Silence of the Lambs (US)
1962	West Side Story (US)	1993	The Unforgiven (US)

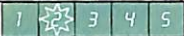


PROJECTS

SCIENCE OF NUMBERS

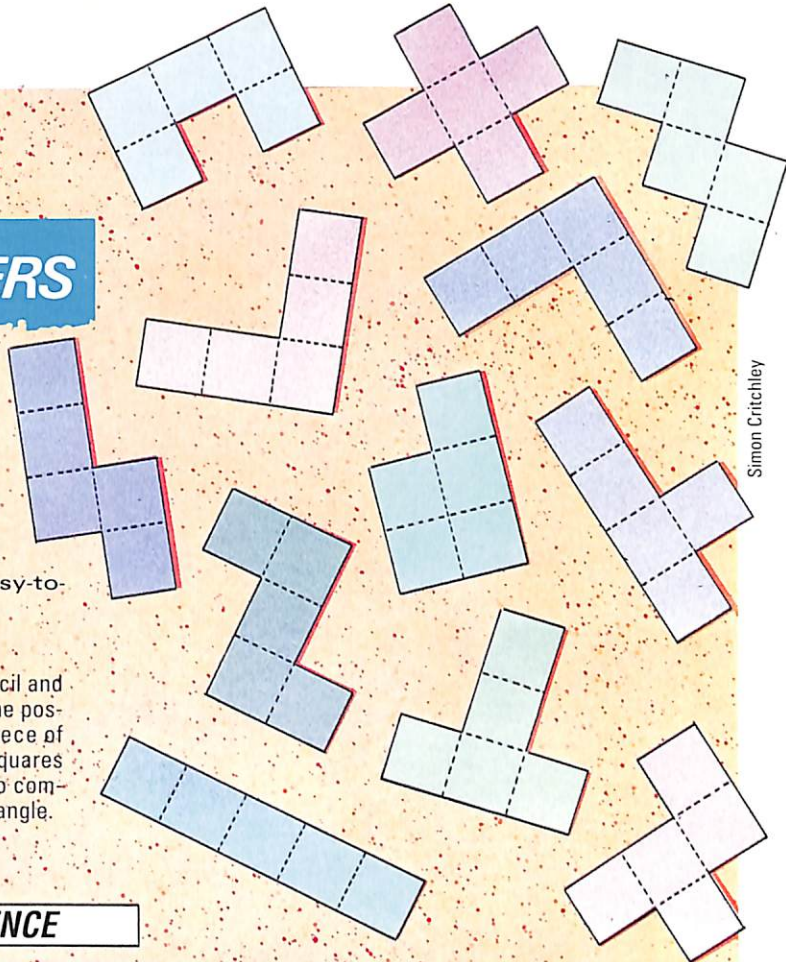
How many rectangles can you make using all 12 of these different shapes?

PAPER PUZZLE



Pit your wits against the computer with this easy-to-make paper puzzle.

All you need for this paper puzzle is a sheet of paper, a pencil and pair of scissors. The 12 shapes shown on the right are all the possible arrangements of five squares. Trace them onto a piece of paper and cut them out. Try to fit them into a rectangle six squares high by ten squares long, using all 12 shapes. According to computer calculations, there are 2,338 ways of forming the rectangle.



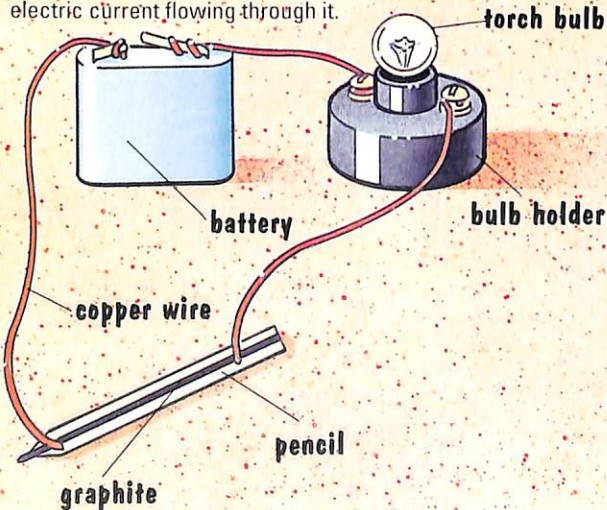
Simon Critchley

ADVENTURES IN THE WORLD OF SCIENCE

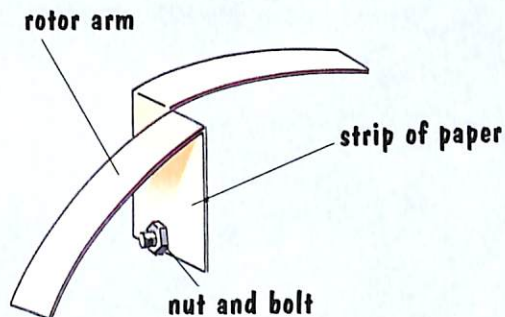
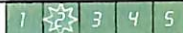
WIRE CIRCUIT



You will need a 9-volt battery, 3x30 cm lengths of copper wire, a pencil, a small hammer, two lengths of insulated wire and a small light bulb. Carefully hit the pencil with a hammer until a small crack appears. Prise the sides apart along the whole length of the pencil until half of the graphite is exposed. Link the bulb to the battery with one of the lengths of wire. Join the other length to the other battery terminal, and attach the third length of wire to the light bulb. Slowly slide the wire contacts up and down the pencil lead. As you move the contacts together the bulb should glow more brightly. This is because the graphite is a bad conductor and so acts as a damper to any electric current flowing through it.



HELICOPTER



You will need a ruler, a pair of scissors, a pencil, a sheet of paper and a small nut and bolt. Measure and mark the paper to the following sizes: 20 cm long, 4 cm wide. Cut it out. Draw a line down the centre of the rectangular strip. Make a mark 13 cm along the line and cut it up to this point. Bend the two flaps. Make a small hole in the uncut end and insert the bolt. Screw on the nut. Throw the paper as high as possible into the air and watch it descend, with its flaps rotating, like a helicopter.

PROJECT INFORMATION



Each **QUEST** project and model has its own difficulty rating: 1 very simple, 2 simple, 3 intermediate, 4 advanced, 5 complicated.

WARNING!

Every care has been taken to ensure projects are as safe as possible. However, parents should supervise all projects. The publisher can accept no liability for injury.

Black holes are the drain pipes of the Universe. They are regions where the pull of gravity is so strong that nothing can escape – not even light. However the hole can grow in size by swallowing gas – or even entire stars. Some science-fiction writers have suggested that black holes might act as tunnels into other universes.

Black holes are thought to form when stars much heavier than the Sun collapse at the ends of their lives. As the shrinking star gets smaller, its gravity becomes ever-stronger until it prevents the star's own light from escaping and the star vanishes from sight.

Black holes distort the very fabric of space and time. A star similar to the Sun (main picture, left) causes little distortion, but the tiny, highly dense objects called neutron stars (centre) make a noticeable dent. A black hole (right) makes a deep gravitational well, like a ball-bearing

on a sheet of rubber.

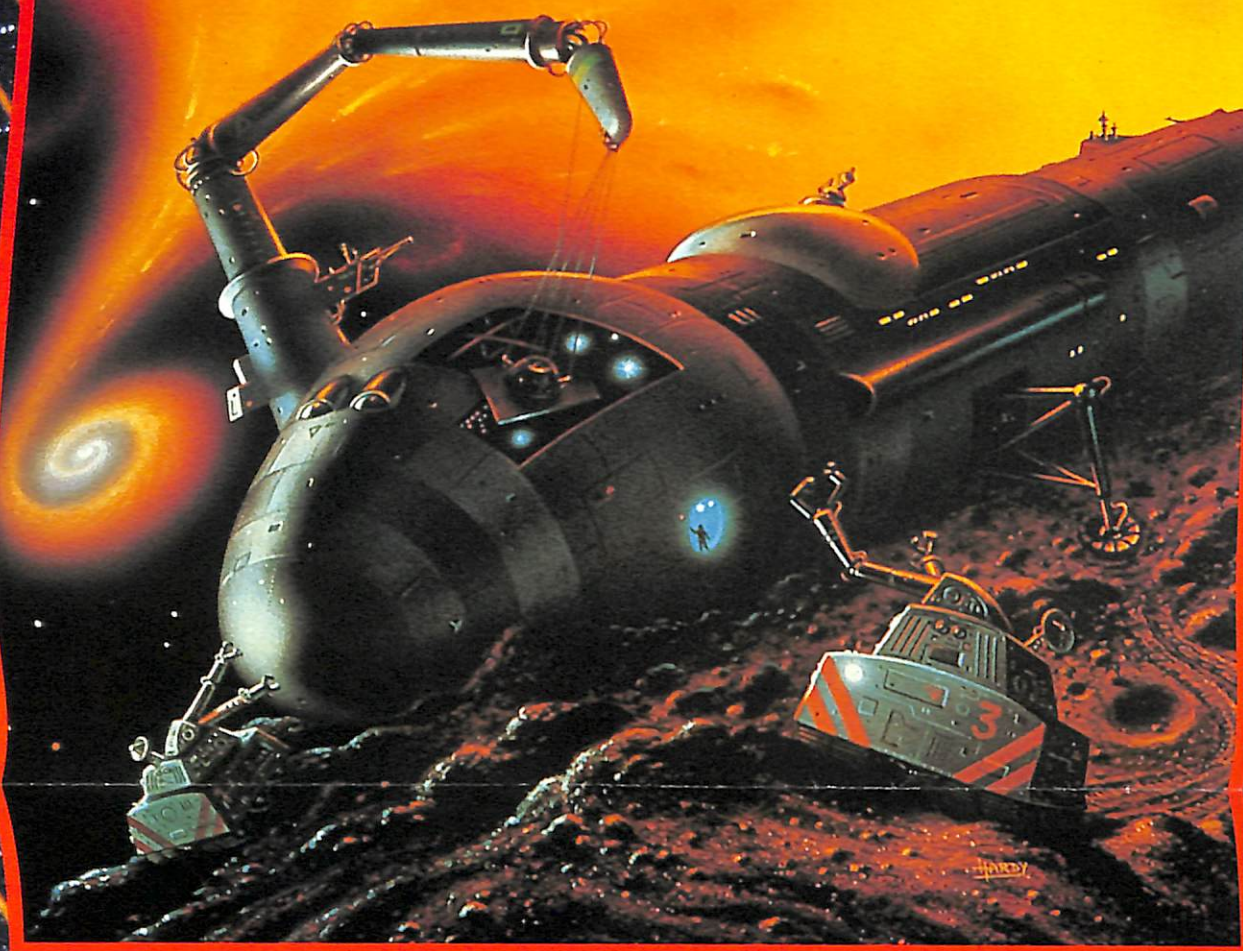
Any astronauts unlucky enough to fall into such a black hole would find themselves stretched like spaghetti in the object's intense gravitational field, finally being crushed out of existence at the hole's centre.

Since the holes are totally black, how can they be seen? They give themselves away when gas falls towards them. The gas spirals around the hole and heats up to millions of degrees, emitting short-wavelength radiation, called X-rays, before it finally vanishes down the cosmic drainpipe. The X-rays can be detected by satellites in space. In this way astronomers have located a probable black hole, Cygnus X-1, in the constellation Cygnus, the swan. Immense black holes, containing the mass of millions of Suns, may lurk at the centres of galaxies and distant quasars.

Julian Baum/Science Photo Library

PYACE

Robots repair a spacecraft that has crashed close to a black hole. In the background, gas is being drawn off a neighbouring giant orange star and is swirling around the black hole before finally vanishing. X-rays from the spiralling hot gas bathe the planet in dangerous radiation so that astronauts dare not venture outside the craft (artist's impression).



David A. Hardy/Science Photo Library

QUEST

HOLE IN SPACE

BLACK HOLES-THE UNIVERSE'S GREATEST MYSTERY